CLAIMS

1. Composition comprising: a biodegradable gel-based matrix, at least one active agent and stem cells able to differentiate into cardiac tissue.

2. Composition according to claim 1 wherein the biodegradable gel-based matrix is made of fibrin or proteoglycans or polysaccharides.

3. Composition according to claim 1 wherein the biodegradable gel-based matrix has an elasticity expressed in E-Modulus of 30-80 kPa.

4. Composition according to claim 1 wherein the biodegradable gel-based matrix has a water content of 90 to 95%.

5. Composition according to claim 1 wherein the active agents are chosen in the group consisting of: growth factors, cytokines, bioactive molecules.

6. Composition according to claim 5 wherein the active agents have an alpha2-plasmin inhibitor sequence in their N-terminus.

7. Composition according to claim 5 wherein the growth factors are chosen in the group consisting of: vascular endothelial growth factor (VEGF), epidermal growth factor (EGF), plateled-derived growth factor (PDGF), transforming growth factor beta (TGFβ), insulin growth factor 1 (IGF1), placental growth factor (PLGF), keratinocyte-derived growth factor (KDGF).

8. Composition according to claim 5 wherein the cytokines are chosen from the group consisting of interleukin 6 (IL-6) family, soluble c-kit ligand (s-kitL) and cardiotrophin-1.

9. Composition according to claim 8 wherein the

cytokines of IL-6 family are: IL-6, leukemia inhibitory factor (LIF).

10. Composition according to claim 5 wherein the bioactive molecules are chosen in the group consisting of: beta-blockers and thymosin β4.

11. Composition according to claim 1 wherein the stem cells able to differentiate to cardiac tissue are embryonic, fetal or adult stem cells.

12. Composition according to claim 11 wherein the stem cells are endothelial progenitor cells (EPCs), mesenchymal stem cells, or monocytes.

13. Composition according to claim 12 wherein the stem cells are isolated from bone marrow or cord blood or peripheral blood or the heart.

14. Use of the composition according to claims from 1 to 13 for the preparation of a medicament for the treatment of heart failure due to myocardial infarction.

15. Medicament according to claim 14 characterized in that it is under the form of a patch.

16. Method for the preparation of the medicament according to claim 15 comprising the following steps:

a) forming a gel substrate of claim 2;

b) admixing to the gel substrate of step a) active agents of claims 5 to 10;

c) seeding stem cells of claim 11 on the gel substrate of step b);

d) cultivating cells of step c) for up to 14 days in order to allow cell differentiation;

e) steps a-d can be repeated sequentially in order to obtain a multi-layer gel assembly.

17. Lentiviral vector modified from pLenti6/BLOCK-iT-DEST comprising cPPT= central polypurine tract cassette, cardiac-specific promoter inserted in a multiple cloning site, a gene of interest, w= woodchuck cassette, EM7 constitutive promoter, blasticidin resistance gene.

18. Lentiviral vector modified from pLenti6/BLOCK-iT-DEST according to claim 17 wherein the cardiac-specific promoter is constitutive or cardiac specific.

19. Lentiviral vector modified from pLenti6/BLOCK-iT-DEST according to claim 17 wherein the gene of interest is EGFP, CSX, MEF2C and hWnt11.

20. Embryonic stem cells according to claim 11 transduced with a Lentiviral vector of claims 17,18,19.

21. Method for the density-based separation of cells of claim 11 comprising the following steps:

a) enzymatic dissociation of cells;

b) separation of cardiogenic cells and cardiac cells by centrifugation on 2 different Percoll gradients where the first gradient is composed by a bottom layer having a density of 1.09 and a top layer having density of 1.05 and the second gradient is composed by a bottom layer of 1.09 and a top layer having density of 1.07.